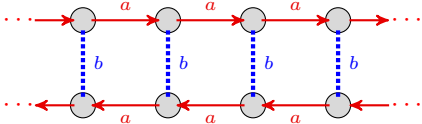


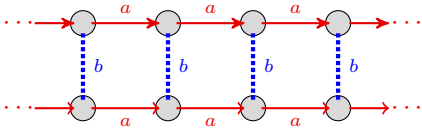
Name: _____

**Abstract Algebra
Quiz 1 Sample**

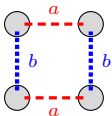
1. A group's generators have a special status in a Cayley diagram for the group. What is that special status?
2. What do the arrows in a Cayley diagram represent?
3. What do the nodes in a Cayley diagram represent?
4. (1) Give two possible generators (in a minimal generating set) for the rectangle puzzle. (2) What other actions are there besides the generators? Used verbs to describe each action.
5. Provide 2 examples of a group. In each case, describe a set of generators. For one of your examples, draw a Cayley diagram.
6. Let r be a clockwise rotation by $2\pi/6$ radians (60°) of a regular 6-gon. This generates a group denoted by $C_6 = \langle r \rangle$ which consists of the 6 rotating actions $\{e, r, r^2, r^3, r^4, r^5\}$.
 - a.) Draw the original configuration of the hexagon and also the other 5 configurations that you would get after applying the 5 non-identity rotations.
 - b.) Draw a Cayley diagram for C_6 with $\{r\}$ as the generating set.
 - c.) Is the group $\langle r^5 \rangle$ (generated by a 300° rotation) the same as C_6 ?
 - d.) List the actions in the group $\langle r^2 \rangle$ (generated by a 120° rotation).
 - e.) List the group $\langle r^3 \rangle$ (generated by a 180° rotation).
 - f.) Is $\{r^2\}$ a generating set of C_6 ? What about $\{r^3\}$?
 - g.) How many elements does the group $\langle r^3, r^4 \rangle$ have? What about $\langle r^3, r^2 \rangle$?
 - h.) Give a possible group presentation for this group.
7. What does it mean for a group to be abelian?
8. Write a possible group presentation using the following Cayley diagram.
Is the group with this Cayley diagram abelian? Explain.



9. Write a possible group presentation using the following Cayley diagram.
Is the group with this Cayley diagram abelian? Explain.



10. Describe a group of actions with the following as a Cayley diagram. Is it abelian? Write a possible group presentation.



11. Describe a group of actions with the following as a Cayley diagram. Is it abelian? Write a possible group presentation.

